

## **FUSED BOOTH ENCODER MULTIPLEXER**

### **ABSTRACT OF THE DISCLOSURE**

A multiplier circuit comprises a fused Booth encoder multiplexer which produces  
5 partial product bits, a tree which uses the partial product bits to generate partial products,  
and an adder which uses the partial products to generate intermediate sum and carry  
results for a multiplication operation. The fused Booth encoder multiplexer utilizes  
encoder-selector cells having a logic tree which carries out a Boolean function according  
to a Booth encoding and selection algorithm to produce one of the partial product bits at a  
10 dynamic node, and a latch connected to the dynamic node which maintains the value at  
an output node. The encoder-selector cells operate in parallel to produce the partial  
product bits generally simultaneously. A given one of the encoder-selector cells has a  
unique set of both multiplier operand inputs and multiplicand operand inputs, and  
produces a single partial product bit. The fused Booth encoder multiplexer unit, tree unit  
15 and adder unit function in a pipeline manner with the units operating on sequential data  
sets during a given processing cycle. The fused Booth encoder multiplexer unit may be  
advantageously laid out in a design of an integrated circuit chip with no gap present in the  
layout, which allows uniform wire length and avoids the necessity of large transistors to  
drive long interconnection wires.